

No. 685,731.

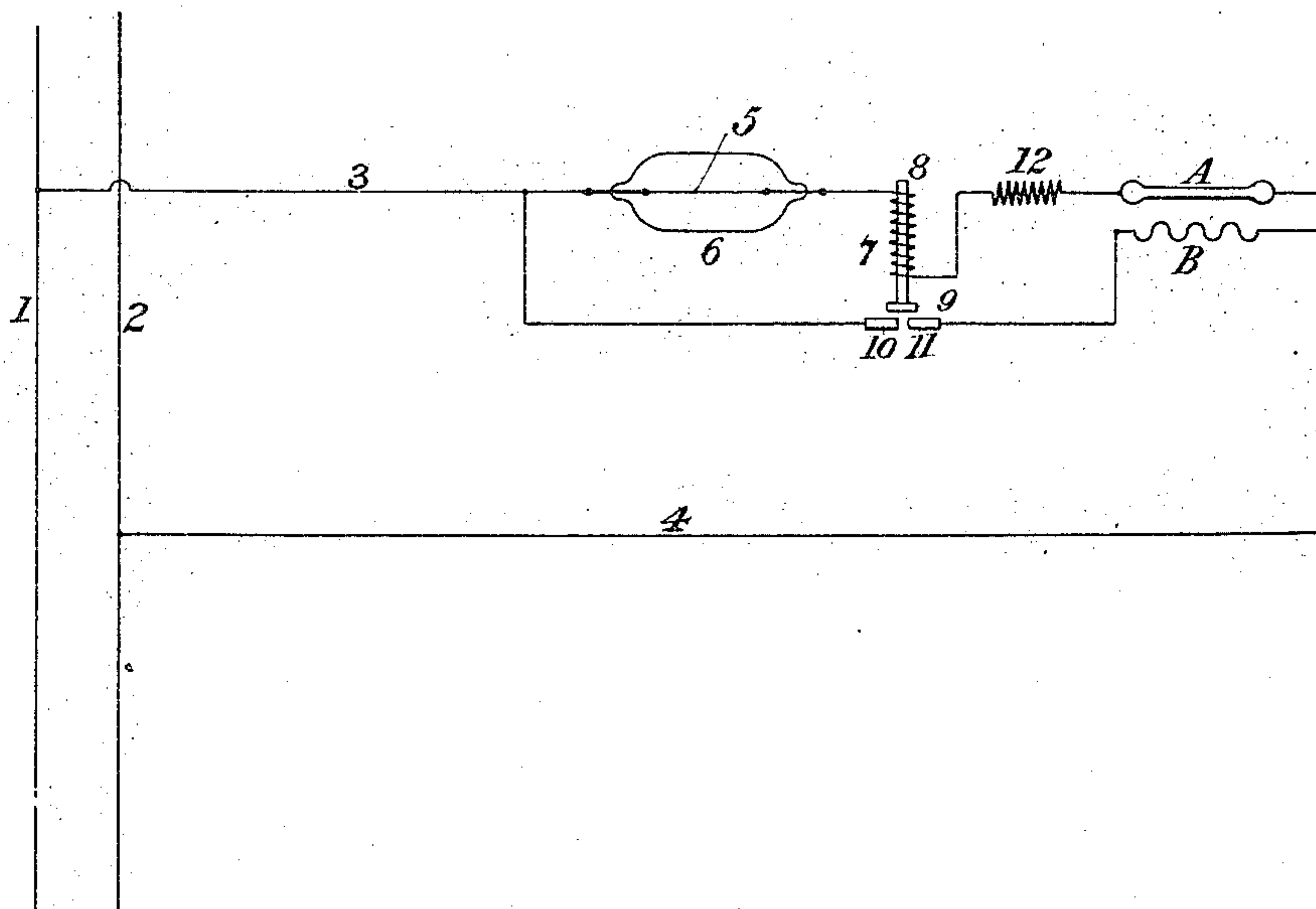
Patented Oct. 29, 1901.

W. NERNST.

BALLAST DEVICE FOR ELECTRIC GLOWER LAMPS.

(Application filed Sept. 29, 1899. Renewed June 30, 1900.)

(No Model.)



Witnesses:
Raphael Ketter
J. H. Jones

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UNITED STATES PATENT OFFICE.

WALTHER NERNST, OF GÖTTINGEN, GERMANY, ASSIGNOR TO GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

BALLAST DEVICE FOR ELECTRIC GLOWER-LAMPS.

SPECIFICATION forming part of Letters Patent No. 685,731, dated October 29, 1901.

Application filed September 29, 1899. Renewed June 30, 1900. Serial No. 22,204. (No model.)

To all whom it may concern:

Be it known that I, WALTHER NERNST, a subject of the Emperor of Germany, residing in Göttingen, Germany, have invented certain new and useful Improvements in Ballast Devices for Electric Glower-Lamps, of which the following is a specification.

The quality possessed by glowers composed of a rare earth or mixtures of rare earths of acquiring an increasing conductivity under the influence of heat has been counterbalanced in the practice of the art by the employment of ballast-conductors placed in series with the glowers. When it comes, however, to the practical manufacture of standardized ballasts and of glowers having uniform qualities under the conditions of practical use it is sometimes found that an additional adjustment of the ballast is needed in order to secure perfectly satisfactory working. In practice it is convenient and desirable in some cases to make use of a ballast which is inclosed in an air-tight chamber or to so construct or arrange the principal portion of the ballast that it is not readily adjustable. I have therefore devised a divided ballast a portion of which is standardized as perfectly as possible, while the remainder is adjusted according to the peculiar conditions of each glower.

I have illustrated my invention in a diagram forming part of this specification.

In the diagram, 1 and 2 are main conductors, proceeding from any suitable source of electric current.

3 and 4 are branch wires, between which a glower A and a heater B are included. In the glower-circuit I place a ballast-conductor 5, which may be an iron wire inclosed in a sealed chamber 6, containing an inert gas. The said ballast-wire is arranged in series with the glower A, and in the same circuit is a solenoid 7, the core 8 of which controls the heater-circuit. On the lower end of the said core is a contact-piece 9, which coöperates with stationary terminals 10 and 11 to close the heater-circuit when the core 8 is in its lowermost position. When, however, the core is raised by a current passing through the solenoid 7 the connection between the contact-piece 9 and the terminals 10 and 11

is broken, thus interrupting the heater-circuit.

The elements which have been described as entering into the glower-circuit may in many instances be sufficient to secure the proper regulation and control of the glowers; but in other cases it may be found necessary to add a special ballast 12 in series with the glower A. This ballast 12, as well as the ballast 5, may be of any preferred form. I have shown the ballast 5 as an inclosed iron wire contained in a sealed chamber. This is simply for purposes of illustration and is not intended to limit me to the use of either kind of ballast-wire alone.

The action of the described circuits is as follows: The current first passes through the heater-circuit and brings the heater B to a suitable degree of heat. The glower under the influence of this heat becomes conductive, and the current then passes through the glower-circuit, energizing the solenoid 7. By the lifting of the core of the said solenoid the heater-circuit is broken, thus preventing the waste of current in the heater-circuit.

The employment of a divided ballast, as heretofore set forth, makes it possible to compensate for any imperfection in the standardized ballast or in the glower, or both. In other words, I can at the last moment employ a special ballast for curing any accidental defects of the glower and the main ballast. In making the final adjustment it will be understood that the object is to so arrange the various elements that the drop of potential in the glower and the main and auxiliary ballast shall equal the potential of the line on which the lamp is intended to operate. I am able to regulate the drop with great nicety by employing the divided ballast described in the foregoing specification.

I claim as my invention—

1. In an electric lamp, the combination with a glower formed from material which is adapted to increase in conductivity under the influence of heat, of a divided ballast, comprising a main ballast and an auxiliary adjustable ballast for modifying the effects of the main ballast.

2. In an electric lamp, the combination of a glower formed from material which is adapt-

ed to increase in conductivity under the influence of heat, of a standard compensating ballast for the glower arranged in series therewith, and an additional ballast, also in series
5 with the glower and adapted to compensate for any inequality in the potential required by different glowers in connection with the standard ballast.

3. In an electric lamp, the combination of
10 a glower formed from material which is adapted to increase in conductivity under the influence of heat, of an inclosed ballast in series with the glower, and an exposed ballast also in series with the glower.

4. In an electric lamp, the combination with 15
a glower of the type described, of a standard compensating ballast for the glower, and an additional ballast adapted to compensate for any inequality in the potential required by
different glowers in connection with the stand- 20
ard ballast.

Signed by me at Berlin this 10th day of August, 1899.

WALTHER NERNST.

Witnesses:

HENRY NOEL POTTER,
WOLDEMAR HAUPT.